Short Report: Clinical Features of Bowel Anisakiasis in Japan

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Abstract. Bowel anisakiasis is rare, and the incidence and clinical features of this condition remain unclear. Using the Japanese Diagnosis Procedure Combination (DPC) in-patient database, we identified 201 cases of bowel anisakiasis between the months of July and December during 2007 and 2008. More than 70% were males. The average age was 54.5 years. Overall, 102 (50.7%) cases had ileus, 16 (8.0%) had perforation or peritonitis, and 4 (2.0%) had intestinal bleeding. Allergic responses, including urticaria, were found in seven (3.5%) patients. Fourteen (7.0%) cases underwent open surgery. Three (1.5%) underwent colonoscopic removal of Anisakis larvae. The average length of stay in the hospital was 9.6 days. The annual incidence of bowel anisakiasis is estimated to be about 3.0 per 1 million people per year. It is important to continue collecting all available data to monitor the trends of this distressing condition.

Human anisakiasis is caused by infection with the third-stage larvae of *Anisakis* sp. or *Pseudoterranova decipiens*, common nematode parasites of marine mammals.¹ The condition occurs after consumption of infected salt-water fish or cephalopod mollusk species, including mackerel, squid, sardine, horse mackerel, salmon, and bonito.²

This serious zoonotic disease, which was first described by Van Thiel and others³ in 1960, has increased throughout the world in the last few decades. The prevalence of anisakiasis is clearly related to traditions of consuming raw, lightly cooked, or marinated seafood, such as Japanese sushi and sashimi, Dutch salted or smoked herring, Scandinavian gravlax, Hawaiian lomi-lomi, and Latin American ceviche.⁴

The development of diagnostic and therapeutic techniques with gastroendoscopy coincides with the increase in the number of reported cases.^{5,6} Clinical features of gastric anisakiasis have been described, and endoscopic diagnostic procedures and treatments are well-established.⁷ Reportedly, most cases of anisakiasis occur in the stomach,⁷ whereas bowel anisakiasis is rare.^{2,5,8} Although there are several case reports describing clinical details in a small number of patients,^{8–10} statistics in clinical features of bowel anisakiasis are scarce.

We have conducted a secondary analysis of the administrative-claims database to examine the occurrence and clinical features of bowel anisakiasis using the Japanese Diagnosis Procedure Combination (DPC) in-patient database, which represents approximately 45% of in-patient admissions to acute care hospitals in Japan.¹¹ Data were compiled between July and December each year by the DPC Research Group funded by the Ministry of Health, Labour, and Welfare, Japan. The database includes data on patients' age and sex, diagnoses, co-morbidities at admission, complications after admission [data were recorded with the International Classification of Diseases, Tenth Revision (ICD-10) codes and text data in the Japanese language], procedures, length of stay, and discharge status. Because gastric anisakiasis can be endoscopically treated in emergency units or outpatient clinics, the DPC in-patient database lacks most of gastric cases. However, the database is usable to examine bowel anisakiasis, because

most patients with bowel anisakiasis are considered to require hospitalization.

In the first step, we selected patients with the diagnosis of anisakiasis (ICD code, T810). The ICD code does not differentiate the anatomical locations of anisakis; therefore, in the second step, they were identified using the Japanese text.

We identified 201 cases with a diagnosis of bowel anisakiasis from 106 hospitals between July 1 and December 31 in both 2007 and 2008; additionally, we identified 223 gastric cases and 6 cases that were not clarified as either gastric or bowel in the same period.

The average ($\pm$ standard deviation) age in the bowel anisakiasis group (54.5 ± 13.9 years) was higher than that in the gastric anisakiasis group (49.2 ± 15.8 years; $P < 0.01$). The rate of male sex was higher in the bowel anisakiasis group (73% versus 61%; $P < 0.01$). Seasonal trends were similar; 135 (67.2%) of 201 bowel anisakiasis and 135 (60.5%) of 223 gastric anisakiasis occurred between September and November.

Of 201 cases with bowel anisakiasis, 102 (50.7%) cases had ileus, 16 (8.0%) had perforation or peritonitis, and 4 (2.0%) had intestinal bleeding. Only one case was diagnosed as intussusception. Allergic responses including urticaria were seen in seven (3.5%) patients. Of 223 gastric cases requiring hospitalization, 22 (9.4%) had gastric bleeding, 4 (1.7%) had perforation or peritonitis, and 4 (1.7%) had allergic responses.

Table 1 shows the rates of complications induced by bowel anisakiasis in each sex and age group. The rate of abdominal complication seemed to be relatively low in younger patients aged ≤ 39 years, but the Fisher's exact test showed no significant difference ($P = 0.075$). The rate of allergic responses was significantly higher in younger patients aged ≤ 39 years ($P = 0.011$).

Of 201 bowel cases, 14 (7.0%) cases underwent open surgery, and 3 (1.5%) underwent colonoscopic removal of Anisakis larvae. The averages of length of stay were 9.6 days [95% confidence interval (CI) = 8.3–10.9 days] and 13.2 days [95% CI = 9.7–16.7 days] in non-surgical and surgical cases, respectively, and the Mann-Whitney test showed a significant difference ($P = 0.003$).

A Japanese report published in 1991 showed that only 567 (4.5%) of 12,586 cases of anisakiasis were bowel-type.⁵ We identified 201 cases of bowel anisakiasis between July and December in 2007 and 2008. The DPC data include about 45% of all the acute-care hospitalization in Japan. A previous Japanese survey reported that, of 2,491 cases of anisakiasis

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TABLE 1
The rate of complications in each sex and age group ($N = 201$)

	Total	Abdominal complications		Allergic responses	
		<i>n</i>	%	<i>n</i>	%
Sex					
Male	146	84	57.5	4	2.7
Female	55	29	52.7	3	5.5
			($P = 0.325$)		($P = 0.292$)
Age (years)					
≤ 39	33	13	39.4	4	12.1
40–69	143	87	60.8	3	2.1
≥ 70	25	13	52.0	0	0.0
			($P = 0.075$)		($P = 0.011$)

(including gastric and bowel anisakiasis) between January and December, 1,463 (59%) occurred between July and December.² Using these data, we have estimated the annual number of cases of bowel anisakiasis to be approximately 380 (201/2/0.45/0.59). The population in Japan is about 126 million people; thus, the annual incidence of bowel anisakiasis in Japan can be estimated to be about 3.0 per 1 million people per year.

This figure, however, may be an underestimation, because some cases might be misdiagnosed as other acute abdominal diseases. Obtaining a recent history of consumption of raw seafood is the most important piece of information when suspecting anisakiasis. Gastric anisakiasis can be confirmed by the detection of *Anisakis* larvae with gastroendoscopy, whereas a definite diagnosis of bowel anisakiasis is often difficult. Reportedly, common clinical symptoms of bowel anisakiasis are abdominal pain, nausea, vomiting, and constipation.⁵ Several clinical findings may be helpful for the diagnosis of bowel anisakiasis: focal thickening of the intestinal wall depicted by ultrasonography or computed tomography and raised eosinophilia in peripheral blood.⁹ However, these findings are not specific to anisakiasis. According to the literature review of 79 cases of surgically treated bowel anisakiasis between 1963 and 2003 in Japan, most of the surgical cases were preoperatively diagnosed as ileus, peritonitis, appendicitis, or intussusceptions, and only three cases had a preoperative diagnosis of bowel anisakiasis.⁸

In our study, 113 (56%) cases of bowel anisakiasis had abdominal complications, but only 14 (7.0%) cases required open surgery, indicating that conservative treatments were successful in most cases. Humans are accidental hosts for *Anisakis* larvae, and the parasites rarely develop further within the human gastrointestinal tract. Conservative treatments were, therefore, successful even in the complicated cases. Anecdotal evidence has shown that even symptomatic cases can be cured within 2 weeks with conservative treatment alone.¹² In our study, the average length of stay for non-surgical patients was 9.6 days, which is consistent with previous reports.

Anisakiasis may be associated with an allergic response, and clinical symptoms range from isolated swellings to urticaria and life-threatening anaphylactic shock.¹³ However, the incidence of allergic response among bowel anisakiasis was unknown. In our study, allergic responses were seen in seven (3.5%) cases, but no anaphylaxis was seen.

Several limitations should be acknowledged. Studies using the administrative-claim database may be limited by incomplete reporting that could lead to overestimation or underes-

timation of the disease and its complications. Some cases of bowel anisakiasis with mild symptoms may have been treated conservatively in outpatient clinics, and our failure to capture such cases may have resulted in an underestimation of the incidence. The monthly prevalence data were insufficient, because data between January and June were not available from the DPC database.

Despite these limitations, the database is useful to examine the trends of occurrence and clinical features of bowel anisakiasis. It is important to continue collecting all available data to monitor the trends of this distressing condition.

Received December 22, 2009. Accepted for publication April 2, 2010.

Acknowledgments: This study was funded by Grants-in-Aid for Research on Policy Planning and Evaluation from the Ministry of Health, Labour, and Welfare, Japan.

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